CENTERS FOR DISEASE CONTROL

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CDC
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Contents

History of CDC Surveillance Activities

CDC has been actively involved in disease-surveillance activities since the formation of the Communicable Disease Center in 1946. The original scope of the National Surveillance Program included the study of malaria, murine typhus, smallpox, psittacosis, diphtheria, leprosy, and sylvatic plague. In 1954, a surveillance section was established within the Epidemiology Branch of CDC, primarily concerned with planning and conducting continuing surveillance and making periodic reports. Occurrences such as the Asian influenza pandemic and the discovery of Legionnaires' disease prompted the involvement of CDC in additional surveillance activities. Over the years the surveillance activities of CDC have expanded to include not only new areas in infectious disease but also programs in human reproduction, injuries, environmental health, chronic disease, risk reduction, and occupational safety and health. Ongoing evaluation of these programs has led to new methods of data collection and analysis and has prompted examination of how data are disseminated to the public health community.

The publication titled *CDC Surveillance Summaries* was initiated in 1982 after a survey was made of CDC staff and state epidemiologists. Results of the survey suggested that improved coordination of surveillance reports with the *MMWR* and the *MMWR Annual Summary* (later titled *Annual Summary of Notifiable Diseases, United States*) would facilitate timely publication; provide greater uniformity in the acquisition, evaluation, and reporting of surveillance data; and encourage the use of these data.

In 1985, the CDC Surveillance Coordination Group was formed with representatives from all Centers/Institute/Program Offices and from the Council of State and Territorial Epidemiologists. The Group was charged with developing and implementing a policy for CDC's public health surveillance activities. State public health officials also actively participate in the activities of the Group. These activities, which are documented in regular reports, are directed toward achieving the following goals: a) conducting epidemiologic surveillance of all health events considered to be of high priority, b) evaluating regularly all CDC surveillance activities, c) developing and evaluating improved methods for the collection, analysis, and dissemination of surveillance data, and d) maintaining and improving the expertise of CDC staff and constituents in the development, implementation, and evaluation of systems of public health surveillance.

Data Sources

Data on the reported occurrence of notifiable diseases are derived from reports supplied by state and territorial health departments and by CDC program activities. These data are published weekly in the *MMWR*, and the final official numbers of cases are published in the *MMWR: Annual Summary of Notifiable Diseases, United States*. Complementary data are provided in *MMWR Surveillance Summaries* and *Recommendations and Reports*. Data reported in the weekly *MMWR* and the more detailed data reported by individual CDC programs are collected independently; therefore, some numbers may be slightly different because of the timing of reports or because of refinements in case definitions.

Data published in the *MMWR* series of publications should be interpreted with caution. Some diseases that cause severe clinical illness and are associated with serious consequences are probably reported quite accurately; however, diseases that are clinically mild and infrequently associated with serious consequences are less likely to be reported. Additionally, subclinical cases are seldom detected except in the course of epidemic investigations or special studies. The degree of completeness of reporting is also influenced by the diagnostic facilities available, the control measures in effect, and the interests and priorities of state and local officials responsible for disease control and surveillance. Finally, factors such as the introduction of new diagnostic tests and the discovery of new disease entities may cause changes in disease reporting independent of the true incidence of disease. Despite these limitations, the data in these reports have proven useful in the analysis of trends and in the development, implementation, and evaluation of public health responses for disease and injury control.

Most Recent Reports Published in the *MMWR* Surveillance Summaries

Subject	Responsible CIO*	Most Recent Report
Abortion	NCCDPHP	1991; Vol. 40, No. SS-2
AIDS/HIV		
Distribution by Racial/Ethnic Group	NCID	1988; Vol. 37, No. SS-3
Among Black and Hispanic Children and Women of Childbearing Age	NCEHIC	1990; Vol. 39, No. SS-3
Behavioral Risk Factors	NCCDPHP	1991; Vol. 40, No. SS-4
Birth Defects		
B.D. Monitoring Program (see also Malformations)	NCEHIC	1990; Vol. 39, No. SS-4
Contribution of B.D. to Infant Mortality Among Minority Groups	NCEHIC	1990; Vol. 39, No. SS-3
Campylobacter	NCID	1988; Vol. 37, No. SS-2
Cholera	NCID	1992; Vol. 41, No. SS-1
Coal Workers' Health (see also Mining)	NIOSH	1985; Vol. 34, No. 1SS
Congenital Malformations, Minority Groups	NCEHIC	1988; Vol. 37, No. SS-3
Dengue	NCID	1985; Vol. 34, No. 2SS
Dental Caries and Periodontal Disease Among Mexican-American Children	NCPS	1988; Vol. 37, No. SS-3
Dracunculiasis	NCID	1992; Vol. 41, No. SS-1
Ectopic Pregnancy	NCCDPHP	1990; Vol. 39, No. SS-4
Ectopic Pregnancy, Mortality	NCCDPHP	1987; Vol. 36, No. SS-2
Elderly, Hospitalizations Among	NCCDPHP	1991; Vol. 40, No. SS-1
Endometrial and Ovarian Cancers	EPO, NCCDPHP	1986; Vol. 35, No. 2SS
Escherichia coli O157	NCID	1991; Vol. 40, No. SS-1
Foodborne Disease	NCID	1990; Vol. 39, No. SS-1
Gonococcal Infection	NCPS, NCID	1984; Vol. 33, No. 4SS
Gonorrhea and Salpingitis, Teenagers	NCPS, NCID	1983; Vol. 32, No. 3SS
Hepatitis	NCID	1985; Vol. 34, No. 1SS
Hepatitis, Viral	NCID	1983; Vol. 32, No. 2SS
Homicide	NCCDPHP	1983; Vol. 32, No. 2SS
Homicides, Black Males	NCEHIC	1988; Vol. 37, No. SS-1
Hysterectomy	NCCDPHP	1986; Vol. 35, No. 1SS
Infant Mortality (see also National Infant Mortality; Birth Defects; Postneonatal Mortality)	NCEHIC	1990; Vol. 39, No. SS-3
Injury		
Death Rates, Blacks and Whites	NCEHIC	1988; Vol. 37, No. SS-3
Drownings	NCEHIC	1988; Vol. 37, No. SS-1
Falls, Deaths	NCEHIC	1988; Vol. 37, No. SS-1
Firearm-Related Deaths, Unintentional	NCEHIC	1988; Vol. 37, No. SS-1
In Developing Countries	NCID	1992; Vol. 41, No. SS-1
In the Home, Persons <15 Years of Age	NCEHIC	1988; Vol. 37, No. SS-1
Motor Vehicle-Related Deaths	NCEHIC	1988; Vol. 37, No. SS-1
Objectives of Injury Control, State and Local	NCEHIC	1988; Vol. 37, No. SS-1
Objectives of Injury Control, National	NCEHIC	1988; Vol. 37, No. SS-1
Residential Fires, Deaths	NCEHIC	1988; Vol. 37, No. SS-1
Tap Water Scalds	NCEHIC	1988; Vol. 37, No. SS-1
Lead Poisoning, Childhood	NCEHIC	1990; Vol. 39, No. SS-4
Low Birth Weight	NCCDPHP	1990; Vol. 39, No. SS-3
Malaria, Imported	NCID	1983; Vol. 32, No. 3SS

*All abbreviations are listed at end of inventory. Readers should check individual summaries when more than one CIO is responsible.

Most Recent Reports Published in the *MMWR* Surveillance Summaries — Continued

Subject	Responsible CIO*	Most Recent Report
Malformations (see also Birth Defects)	NCEHIC	1985; Vol. 34, No. 2SS
Maternal Mortality	NCCDPHP	1991; Vol. 40, No. SS-2
Mining (see also Coal Workers' Health)	NIOSH	1986; Vol. 35, No. 2SS
National Infant Mortality (see also Infant Mortality; Birth Defects)	NCCDPHP	1989; Vol. 38, No. SS-3
Nosocomial Infection	NCID	1986; Vol. 35, No. 1SS
Occupational Injuries/Disease		
Among Loggers	NIOSH	1983; Vol. 32, No. 3SS
Hazards, Occupational	NIOSH	1985; Vol. 34, No. 2SS
In Meatpacking Industry	NIOSH	1985; Vol. 34, No. 1SS
State Activities	NIOSH	1987; Vol. 36, No. SS-2
Treated in Hospital Emergency Rooms	NIOSH	1983; Vol. 32, No. 2SS
Ovarian Cancer (see Endometrial and Ovarian Cancers)		
Parasites, Intestinal	NCID	1991; Vol. 40, No. SS-4
Pediatric Nutrition	NCCDPHP	1983; Vol. 32, No. 4SS
Pelvic Inflammatory Disease	NCPS	1983; Vol. 32, No. 4SS
Plague	NCID	1985; Vol. 34, No. 2SS
Plague, American Indians	NCID	1988; Vol. 37, No. SS-3
Pneumoconiosis, Coal Miners	NIOSH	1983; Vol. 32, No. 1SS
Poliomyelitis	NCPS	1992; Vol. 41, No. SS-1
Postneonatal Mortality	NCCDPHP	1991; Vol. 40, No. SS-2
Pregnancy, Teenage	NCCDPHP	1987; Vol. 36, No. 1SS
Psittacosis	NCID	1983; Vol. 32, No. 1SS
Rabies	NCID	1989; Vol. 38, No. SS-1
Racial/Ethnic Minority Groups	Various	1990; Vol. 39, No. SS-3
Reye Syndrome	NCID	1984; Vol. 33, No. 3SS
Rocky Mountain Spotted Fever	NCID	1984; Vol. 33, No. 3SS
Rubella and Congenital Rubella	NCPS	1984; Vol. 33, No. 4SS
Salmonella	NCID	1988; Vol. 37, No. SS-2
Sexually Transmitted Diseases in Italy	NCPS	1992; Vol. 41, No. SS-1
Salpingitis (see Gonorrhea and Salpingitis)		
Smoking	NCCDPHP	1990; Vol. 39, No. SS-3
Sudden Unexplained Death Syndrome Among Southeast Asian Refugees	NCEHIC, NCPS	1987; Vol. 36, No. 1SS
Suicides, Persons 15-24 Years of Age	NCEHIC	1988; Vol. 37, No. SS-1
Summer Mortality	NCEHIC	1983; Vol. 32, No. 1SS
Syphilis	NCPS	1991; Vol. 40, No. SS-3
Toxic-Shock Syndrome	NCID	1984; Vol. 33, No. 3SS
Trichinosis	NCID	1991; Vol. 40, No. SS-3
Tubal Sterilization Among Women	NCCDPHP	1983; Vol. 32, No. 3SS
Tuberculosis	NCPS	1991; Vol. 40, No. SS-3
Water-Related Disease	NCID	1991; Vol. 40, No. SS-3

Abbreviations

NCCDPHP	National Center for Chronic Disease Prevention and Health Promotion
NCEHIC	National Center for Environmental Health and Injury Control
NCID	National Center for Infectious Diseases
CIO	Centers/Institute/Offices
NCPS	National Center for Prevention Services
EPO	Epidemiology Program Office
NIOSH	National Institute for Occupational Safety and Health

Special Focus I:
Public Health Surveillance
and
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1992

with contributions from

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National Center for Prevention Services
Pan American Health Organization
World Health Organization

Foreword

Recurring and emerging public health problems continue to have substantial impact on populations around the world. Some—such as a volcanic eruption in the Philippines or repeated flooding in Bangladesh—occur suddenly and have a relatively local effect, whereas others—such as the continually expanding cholera epidemic that began in South America—continue over a protracted period and affect an entire hemisphere. And the ongoing spread of human immunodeficiency virus infection has now reached global proportions.

Regardless of the etiology, for each of the categories of problems outlined above, public health surveillance efforts are crucial in identifying and mounting an effective public health response. Because of the fundamental importance of timely and accurate surveillance data, as CDC Director I have placed a priority on the strengthening of existing systems and the development of new approaches necessary to address public health problems in the United States. I also wish to stress the need to provide assistance in responding to problems in other parts of the world. This issue of *MMWR: CDC Surveillance Summaries*—and a second companion issue to be published during 1992—focuses on special considerations regarding public health surveillance in international settings. Both issues include reports of surveillance efforts in the areas of infectious and noninfectious health problems; they reflect the diversity of approaches to public health surveillance used by several contributors, including international organizations, public health agencies in other countries, and CDC programs.

The public health problems represented in these reports also reinforce one of the focal points of the upcoming International Symposium on Public Health Surveillance, cosponsored by the Carter Center of Emory University, CDC, the Emory University School of Public Health, the Pan American Health Organization, and the World Health Organization. This focus—and the challenge it implies—is that public health surveillance must be advocated as an essential part of the global health agenda if we are to achieve international goals for improving health status.

I invite you to join me in responding to this challenge.

William L. Roper

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Director, Centers for Disease Control

Surveillance for Dracunculiasis, 1981–1991

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Summary

In 1986 the World Health Organization (WHO) designated dracunculiasis (guinea worm disease) as the next disease scheduled to be eradicated (by 1995) after smallpox. Dramatic improvement in national and international surveillance has played a key role in the global eradication campaign, which was initiated at CDC in 1980. About 3 million persons are still affected by the disease annually, with adverse effects on their health as well as on agricultural production and education. Over 100 million persons are at risk of having the disease in more than 20,000 villages in India, Pakistan, and 17 African countries. At least one nationwide, village-by-village search to detect all villages with endemic dracunculiasis and count cases is recommended at the outset of each national campaign, followed by monthly reporting by village-based health workers in the targeted villages during the implementation phase. Rapid dissemination of the results of the surveillance is critical. Intensive case detection and containment—with rewards for reporting of cases—are most appropriate near the end of each campaign. Cameroon, Ghana, India, Nigeria, and Pakistan have pioneered the various surveillance methods for this disease in recent years. Methods for conducting surveillance of dracunculiasis and other important diseases must continue to be developed and improved as countries now believed to be free of dracunculiasis prepare to apply to WHO for certification of elimination of dracunculiasis.

INTRODUCTION

Background

Dracunculiasis (guinea worm disease) has been the subject of a global eradication campaign that was initiated at CDC in 1980 in connection with the beginning of the International Drinking Water Supply and Sanitation Decade (1981–1990). This eradication effort was first endorsed by the World Health Assembly in 1986, just before the Global 2000 project of the Carter Center began to take a leading role in the campaign in collaboration with CDC. The 1991 World Health Assembly officially set the global target of achieving eradication of dracunculiasis by the end of 1995—a target that African Ministers of Health, representing the overwhelming majority of countries that still have endemic drancunculiasis, had already set for themselves as of 1988 (*1*). In

1989 the International Task Force for Disease Eradication agreed that dracunculiasis and poliomyelitis can become the next diseases to be eradicated after smallpox (*2*).

Transmission

Dracunculiasis (caused by the parasite *Dracunculus medinensis*) is currently endemic in parts of India, Pakistan, and 17 African countries (Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Mali, Mauritania, Niger, Nigeria, Senegal, Sudan, Togo, and Uganda), where over 100 million persons are at risk of having the infection (Figure 1) (*3,4*). Humans contract the infection by drinking water from stagnant open sources, such as ponds, that contain small copepods or "water fleas" that harbor the immature stage of the guinea worm. The copepods become infected when persons with mature worms emerging through their skin enter the water, thus allowing the adult female worms to deposit thousands of larvae, which are ingested by copepods. The parasites mature in humans in a year and then emerge through the skin (usually of the foot or leg) to begin the cycle anew (Figure 2). People do not develop immunity to the infection, and there is no known animal reservoir of the parasite that infects humans.

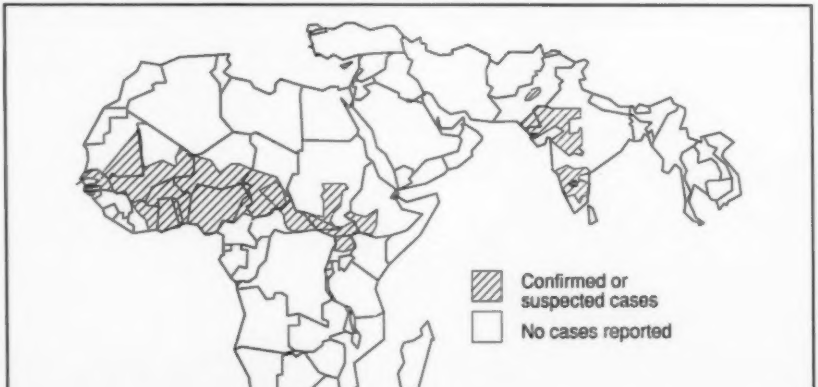
This disease is a substantial public health concern because it occurs during the planting or harvest season, when it incapacitates one-third or more of some village populations simultaneously—for periods ranging from weeks to months. Since it affects mainly children and working-age adults, it has a severe negative impact on the health, agricultural production, and school attendance of affected populations (*1*).

Status of Surveillance Efforts

When the eradication campaign began, surveillance for dracunculiasis had traditionally been even more poorly conducted than that leading to the routine reporting of most diseases. The main reasons for this are

- almost all persons who have dracunculiasis acquire it in remote rural areas,

FIGURE 1. Areas in which dracunculiasis is reported or probably exists



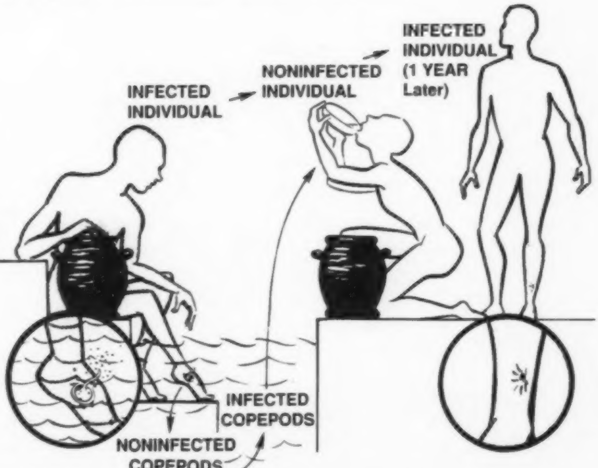
- the disease itself makes it difficult or impossible for many of its victims to walk or travel, and
- there has never been any treatment to cure the affliction and thus serve as an incentive for patients to seek medical attention at clinics, hospitals, or dispensaries where their condition might be recorded for reporting to authorities.

In an area of Rajasthan, India, in 1978–1979, for example, not one of 985 patients examined during a survey of villages had visited a health center (*5*). More recently, in Mali, researchers found that 1,111 cases of dracunculiasis had actually occurred in 68 villages they investigated late in 1989, but only two cases had been noted in routine reporting to public health authorities for the same year. However, when authorities decide to conduct surveillance for dracunculiasis, the obvious manifestation of the disease, which involves the emergence of a long worm through the patient's skin, is a unique characteristic that facilitates accurate reporting even by persons without formal training.

STRATEGIES AND METHODS

Surveillance for dracunculiasis has improved greatly over the past decade in the course of the eradication campaign. Different types of surveillance are appropriate at different stages of national dracunculiasis eradication programs (*6*). Four such stages are apparent.

FIGURE 2. Life cycle of *Dracunculus medinensis*



- The mature female worm pierces the skin of the lower leg, causing an ulcer.
- When the ulcer comes in contact with water, the female worm discharges larvae into the water.
- Cyclopoid copepods (small fresh-water crustaceans) become infected by ingesting the larvae.
- Humans drink the water contaminated with the infected copepods.
- The ingested larvae mature in humans in 1 year.

- First, at the beginning of an eradication program, a nationwide, **village-by-village search** for dracunculiasis is necessary.
- Second, during the implementation phase, **village-based monthly reporting** of cases is most helpful.
- Third, in the **final "case-containment" phase**, rapid detection and containment of all cases are of paramount importance.
- Finally, when the disease has disappeared or is thought to have been eradicated, special measures are required to **obtain reliable evidence that the disease is not still being transmitted**; at the same time effective surveillance for other priority diseases and conditions is begun.

So far, all these methods except the last have been used in different national programs to eradicate dracunculiasis. These methods and the results of their application are described below.

Village-by-Village Search

The nationwide village-by-village search for cases of dracunculiasis was pioneered by the Indian Guinea Worm Eradication Program (GWEP), in emulation of similar searches conducted during the latter stages of the Smallpox Eradication Program (*7*). The Indian GWEP subsequently used searches at 12-month, 6-month, then 4-month intervals in areas known to have endemic disease as the main means of monitoring and evaluating progress in the campaign to eradicate dracunculiasis.

This method is strongly recommended as perhaps the single most important first step in initiating a dracunculiasis eradication program (*8,9*). Although routine reports, published studies, and postal surveys can provide valuable leads for tracking the disease and confirming its existence in parts of the country, there is *no* substitute for conducting a village-by-village search nationwide, at least once, to ascertain quickly the full extent of the disease's distribution—including the location and the intensity of local transmission.

The nationwide searches require mobilization of a large number of public health and other workers for about 1–4 weeks, so that all villages in the country can be visited quickly. The shorter the period of the search, the more likely are requests to borrow personnel for this temporary service to be granted. Questionnaires are brief, uniform, and pretested. "Recognition cards" featuring color photographs of patients with typical emerging worms—and the name(s) of the disease in local languages or dialects—are also used to enhance the accuracy of case finding. The searchers—who may include personnel from family planning, malaria, immunization, agricultural extension, Peace Corps, and other programs—are carefully trained and supervised. When searchers enter a village, their first question is whether that community has had at least one case of dracunculiasis during the period in question. If the answer is no, they go on to the next village. If the answer is yes, they complete the rest of the questionnaire. Detection of all villages where a case of dracunculiasis has occurred (as defined by WHO: "an individual exhibiting or having a recent [about 1 year] history of a skin lesion with emergence of a guinea worm") (*10*), usually in the previous 12 months, is the first priority of the search. Determination or estimation of the actual incidence of cases during the period in question is second priority. Determination of point prevalence of the disease at the time of the search is much less important.

To be maximally useful, a provisional summary of the results of the search for cases should be prepared by those in charge of the national case search and made available to other officials within the Ministry of Health, the Ministry of Water, participating donor agencies, WHO, and other national and international partners in the eradication effort within 4 weeks of the completion of the survey. Those in charge of the national case search should consider making a brief report to WHO for publication in the *Weekly Epidemiological Record.* At a later date, a national conference should be convened by the Ministry of Health to formally present and publicize the results of the national case search.

Village-Based Surveillance

As villages with endemic drancunculiasis are identified, one or more residents of each such village are designated to provide monthly reports of cases in the village to the next-level supervisor. Such residents are usually selected by the villagers or designated by the village leader(s). If a village already has a resident primary health-care worker or equivalent, that person is assigned responsibility for reporting cases of dracunculiasis each month. Usually, however, the remote villages that have dracunculiasis do not yet have such primary health-care workers. Village-based reporters may be volunteers or be paid a nominal amount in cash or in kind, depending on national and local policies and resources.

With village-based reporters, training and supervision are key factors. Such persons are taught how to conduct household visits within the village each month, record cases of dracunculiasis in a register for the village, report the information to a health-outreach team that may visit the village periodically, or report the information from the case register each month directly to the nearest primary health outpost. Depending on local circumstances, they may also provide simple dressing of patients' wounds, convey relevant health education messages, or dispense and demonstrate use of cloth filters for household use in preventing the disease. They should report at the agreed-upon intervals even if no new cases have occurred.

Cameroon, Ghana, Nigeria, and Pakistan have pioneered village-based reporting for dracunculiasis. An important contributory measure at this stage is to make reporting of dracunculiasis officially mandatory.

Case Containment

This method is appropriate a) when cases are few and elimination of dracunculiasis from a country or subnational geographic area appears to be imminent and b) in instances in which there has been importation of cases into areas that had not had endemic dracunculiasis. Case containment was first described for use in dracunculiasis eradication in Pakistan early in 1990 (*11,12*). It has since been adapted for use in Cameroon and India.

The key to the surveillance element in this method is to detect each case of dracunculiasis as soon as possible after it becomes patent, to prevent any further transmission associated with that case. Specific quantifiable standards are established for each stage of the process, e.g., to detect each new case within 24 hours of emergence of the worm, to report each new case to the next-level supervisor within 24 hours, and the like. Eventually, a premium could be placed on detection of cases at the pre-eruptive blister stage, before infected persons have had any opportunity to contaminate local sources of drinking water.

In Pakistan and India, cash rewards have been used and advertised widely as a means of increasing the sensitivity of surveillance at this stage of the program. Such rewards are paid to any villager, health worker, or patient with dracunculiasis who reports the first case in a village (Pakistan, 1991) or who first reports any case of dracunculiasis (India).

Verifying the Absence of Dracunculiasis

In several countries (Central African Republic, Gambia, Guinea, Iran, Saudi Arabia), dracunculiasis has apparently disappeared or been deliberately eliminated in the past 10–15 years. WHO has indicated that, to be certified as being free of dracunculiasis, countries that once had endemic disease will have to provide evidence that they have detected no indication of transmission of dracunculiasis for at least 3 years, despite having conducted effective surveillance programs specifically aimed at detecting any such transmission (*13*). Because dracunculiasis used to be much more widespread than it has been recently, more than 65 countries in Asia, Africa, and the Americas will require some form of official certification from WHO that dracunculiasis no longer occurs within their national boundaries.

Methods of conducting such surveillance for dracunculiasis while simultaneously conducting surveillance for other priority diseases or conditions (e.g., poliomyelitis) are being developed so that assistance agencies and countries that once had endemic dracunculiasis can make optimal use of scarce resources. Development of model systems for combining surveillance for dracunculiasis with surveillance for other diseases in countries that no longer have endemic dracunculiasis is now being considered in Gambia, Guinea, and several other countries. Poliomyelitis is one example of a disease for which good surveillance is an increasingly important priority and for which such surveillance could be successfully combined with surveillance for dracunculiasis. Other examples include diseases targeted by the Expanded Program on Immunization, diarrheal diseases, and onchocerciasis.

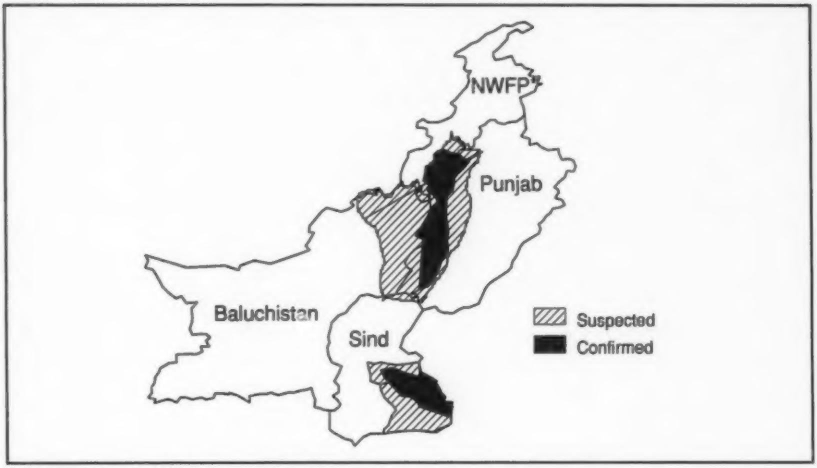
RESULTS

Village-by-Village Search

Each of the first three countries to conduct searches after India's initial effort produced unexpected results. In Pakistan, the national search found in 1987 that the actual area that continued to have endemic dracunculiasis was substantially smaller than authorities had believed, as was the total estimated number of cases (Figure 3). In Nigeria, fewer cases were found in the first search in late 1988 than the most recent estimates had indicated (653,000 vs. 2.5 million), but the number established through the search was still much higher than the 4,000–5,000 cases that had been reported each year up to that time. Moreover, the level of specificity of data on the intensity of endemicity and location of cases was far greater than had previously been available for dracunculiasis or any other disease in Nigeria. (This first search in Nigeria involved visits to an estimated 80% of the country's 90,000 rural communities, at a cost of approximately $100,000.) In Ghana, the numbers of cases found were substantially higher than most national authorities had expected, even though increasingly detailed surveys and public mobilization in the years immediately preceding the first search had already led to substantially larger annual totals of reported cases (Figure 4).

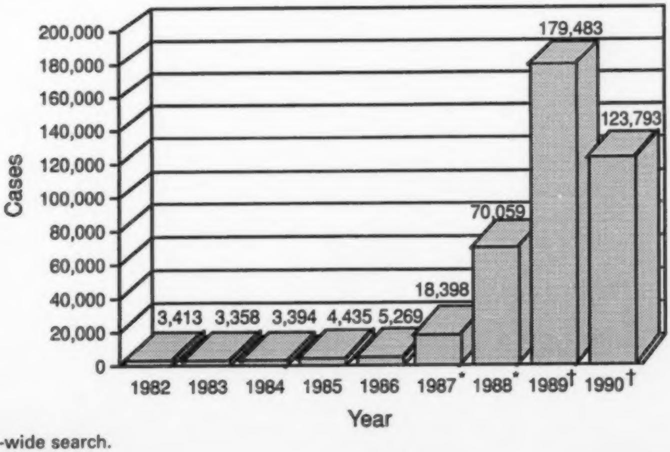
India still conducts village-by-village searches of communities in areas with known or suspected endemic dracunculiasis three times a year, as the main basis for surveillance in that country's GWEP (Figure 5). Ghana and Nigeria conducted two and three annual searches in 1989–1990 and 1988–1990, respectively. The third search in

FIGURE 3. Areas with confirmed and suspected endemic dracunculiasis — Pakistan, 1987



*NWFP = North West Frontier Province.

FIGURE 4. Guinea worm eradication program, number of reported cases — Ghana, 1982–1990



*Area-wide search.
†National search.

Nigeria was limited to villages with known or reported endemic disease and also included providing health education or other control measures in some villages (Figure 6) (*14*). Both countries, which along with Pakistan and Uganda are assisted directly by Global 2000, shifted to monthly village-based reporting of cases in 1991.

FIGURE 5. Guinea worm endemicity — India, 1982–1990

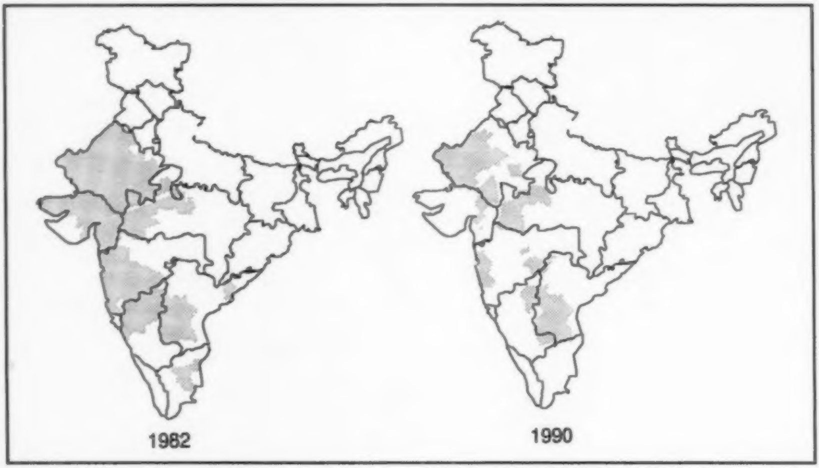
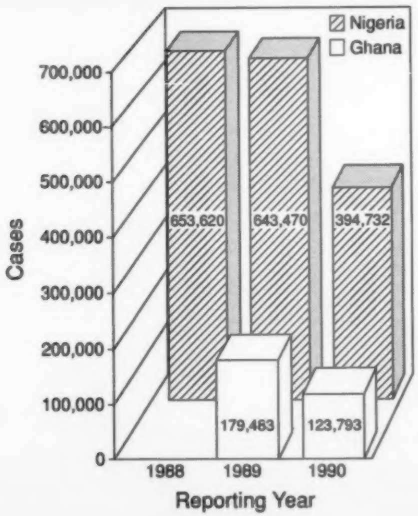


FIGURE 6. Dracunculiasis cases in Nigeria (1988–1990) and Ghana (1989–1990)



At present, most of the remaining countries with endemic dracunculiasis have completed at least one nationwide village-by-village search for cases, with financial assistance provided by the United Nations Children's Fund (UNICEF) (Figure 7). Searches were still under way in Mali and Uganda at the beginning of 1992, while Chad, Ethiopia, Kenya, and Sudan have not yet begun their first such search. Such searches in 1990–1991 have provided the most accurate and detailed picture ever available on the distribution of dracunculiasis and on the actual numbers of cases and affected villages in countries with endemic disease. The previously hidden bulk of endemicity now stands almost completely revealed (Figure 8).

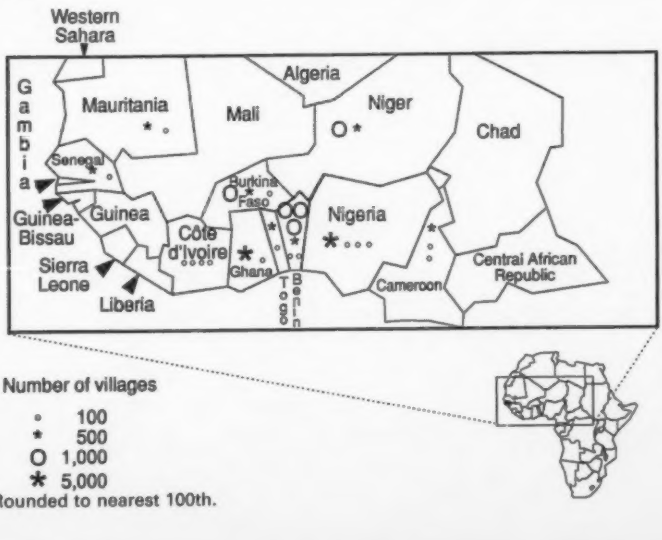
Village-Based Surveillance

Almost from the beginning of the GWEP in Pakistan, data collection has permitted month-by-month tracking of the program's progress (Figure 9). As the Ghanaian and Nigerian GWEPs shifted to this form of surveillance in 1991, they began to receive similar monthly feedback of progress based on control measures carried out 12 months earlier. Results are not yet available for the program in Nigeria, but the rates of monthly reporting from the >5,000 villages in Ghana known to have endemic dracunculiasis (within 1 month of the end of the reporting month) have increased from 60.5% of endemic villages in April 1991 to 82.8% in November 1991.

Case Containment

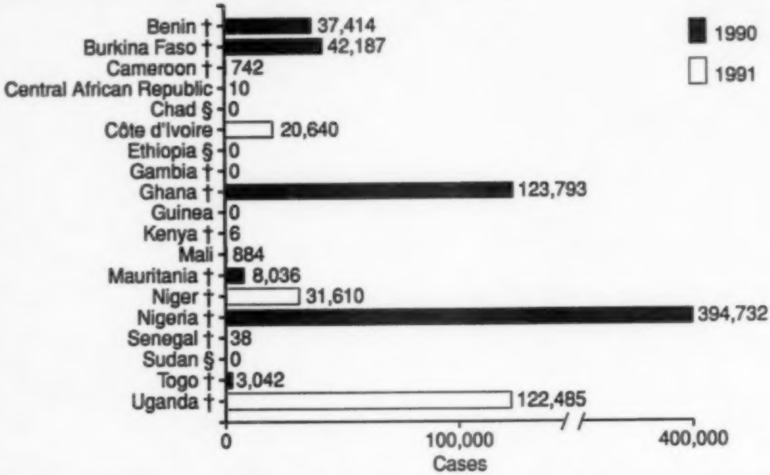
As implemented in Pakistan in 1990, this method of surveillance and control of cases produced results that were less satisfactory than expected. Indices in 1990 suggested that over 85% of cases were detected and contained within 24 hours of emergence of the worm, and a survey conducted late in 1991 found that a large

FIGURE 7. Villages with completed searches for endemic dracunculiasis* – West Africa



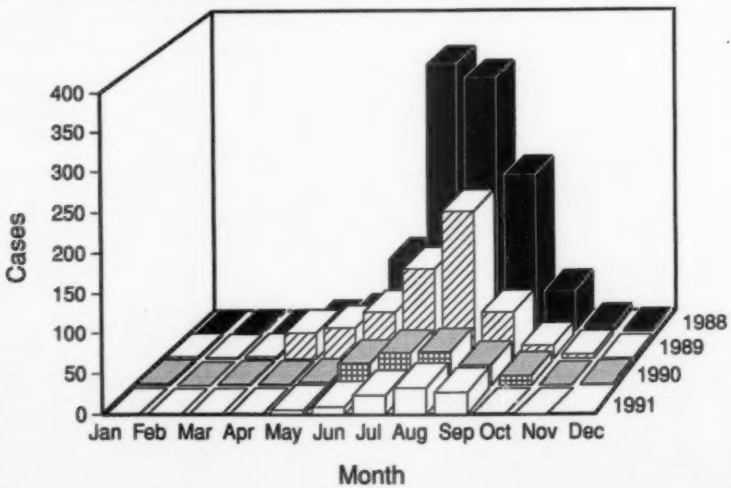
*Rounded to nearest 100th.

FIGURE 8. Dracunculiasis cases — Africa, 1990–1991*



*Data for 1990 and provisional data for 1991 were reported to the World Health Organization from passive reporting and/or active-case searches.
†National survey.
§No data available.

FIGURE 9. Dracunculiasis cases by month — Pakistan, 1988–1991



majority of residents in villages with endemic dracunculiasis knew of the reward for reporting the first case in a village. However, there also were strong indications that in the village with the highest incidence of cases in the country (Ganju in North West Frontier Province), a number of cases were not detected by the program in 1990, and hence proper containment measures were not applied. Overall, reported cases were reduced only 36% in Pakistan in 1991 from the level in 1990 (Table 1).

Provisional data indicate that similar case-containment measures produced reductions of 54% in both Cameroon and India in 1991 from the levels in 1990 (Table 1).

DISCUSSION

As used in several national GWEPs, the nationwide village-by-village search has proven to be a valuable tool for determining rapidly the status of dracunculiasis endemicity in countries with endemic disease. In addition to providing indispensable baseline epidemiologic knowledge for appropriate planning, monitoring, and evaluation of the GWEP, the results of such national searches are also an invaluable resource for mobilizing national and international decision makers in support of the program. A realistic national plan of action for eliminating dracunculiasis from a country cannot be prepared without the kind of detailed information on the scope of the national problem that such a search produces.

On occasion, the potential value of such searches has been greatly impaired because of delays in dissemination of the results. Such delays (as long as 12 months after completion of the search itself) have sometimes occurred because of poor communications or because of efforts to conduct "complete" or "definitive" analyses before releasing any of the data. For example, one country completed its national

TABLE 1. Cases of dracunculiasis, by country — Africa, India, and Pakistan, 1980, 1990, 1991

	1980	1990		1991*	
Country	Cases	Cases	Villages	Cases	Villages
Benin		37,414	3,762	4,006	
Burkina Faso	2,620	42,187	2,621		
Cameroon		742	86	393	74
Central African Republic		10			
Chad					
Côte d'Ivoire	6,712	1,360		20,064	548
Ethiopia					
Ghana	2,703	123,793	5,111	66,697	5,336
Kenya		6			
Mali	816	884			
Mauritania	651	8,036	511		
Niger	1,906			31,610	1,510
Nigeria	1,693	394,732	5,270	170,026	2,847
Senegal		38		1,341	68
Sudan					
Togo	1,748	3,042		5,118	584
Uganda		4,704		122,485	
India	2,729	4,798	897	2,185	576
Pakistan		160	56	106	36
Total	**21,578**	**621,906**	**18,314**		

*Data for 1991 are provisional.

case search in 1990, but results were not made known outside the country until a year later. One country conducted its search over a 2-year period and never during that time provided periodic provisional updates of the search results. At other times, the attempted use of computers has delayed rather than facilitated even preliminary analysis of search results (e.g., total number of cases and villages with endemic dracunculiasis found in the country) because of delays in entry of data into the computer, missing spare parts, or other technical problems. In such situations, it is important to recall that the main purpose of obtaining such data is the use of information to help improve the lives of the persons affected as quickly as possible and that less than two decades ago national Smallpox Eradication Programs routinely managed even larger amounts of data promptly without computers.

The nationwide searches for dracunculiasis have been used to gather surveillance data simultaneously about urinary schistosomiasis in Ghana and about family planning in Nigeria, as well as to provide an opportunity for provision of vaccinations to children in previously unreached populations in Nigeria.

Although the village-by-village searches are ideal for quickly determining the extent of dracunculiasis in countries with endemic disease and have been used to monitor progress annually in India (since the early 1980s), Nigeria (1988–1990), and Ghana (1989–1990), village-based monthly reporting is preferable once a program has been implemented. Comparison of monthly figures against the previous year's monthly figures is an even more powerful tool for monitoring the program and motivating program workers and others than are annual search data. The more intensive focus on villages that actually have dracunculiasis also is logistically simpler than trying to reach all villages in the country. Even if subsequent annual village-by-village searches are limited to villages known to have endemic dracunculiasis, village-based surveillance workers still offer the additional advantage of being able to provide control measures rapidly as cases appear.

Most developing countries express a commitment to providing primary health care to as many of their citizens as possible as the main means of achieving "health for all by the year 2000." Village-based health workers are often included as a part of such schemes in theory—and less often in practice—especially in the more remote villages. The village-based surveillance workers in GWEPs embody such envisioned activities, although they may start out with a much narrower mandate, i.e., dracunculiasis reporting and control. Such experienced workers are a potentially valuable resource for broader use as primary health-care workers for disease surveillance and control in their villages after they complete their assignment for dracunculiasis eradication, and sometimes even while they are still working in the eradication program.

In countries where dracunculiasis has already been or is almost eradicated, it would be very costly and inefficient to undertake surveillance for dracunculiasis alone to meet the requirement for certification of elimination. The need for rapid development of systems suitable for conducting reliable surveillance for dracunculiasis simultaneously with other diseases is now urgent and must be stressed.

CONCLUSION

The net result of the increasingly complete surveillance for dracunculiasis over the past decade has been to establish the eradicability of dracunculiasis even more firmly than had generally been believed in earlier years. The distribution of the disease in

areas that continue to have endemic disease is now clearer, and the total number of cases remaining is lower than had been previously postulated on the basis of earlier passively reported information.

Acknowledgment

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Injury Surveillance in Developing Countries

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Summary

In both developed and developing countries, injuries have a substantial effect on the public's health and on quality of life. Although epidemiologic data regarding the occurrence of injuries in developing countries are limited, recent studies have documented substantial injury-related morbidity and mortality in some of these countries. For example, recent studies in rural Papua New Guinea showed that injuries are the leading cause of death for persons ages 15–44 years. Similarly, injuries are the leading cause of hospitalization in Indonesia and Egypt. Surveillance of injuries is necessary in order for public health practitioners and planners in developing countries to direct and allocate scarce resources appropriately.

INTRODUCTION

Worldwide, approximately 3 million people die each year from injuries, and about one-third of all hospitalizations result from injuries (*1*). The term "epidemiologic transition" has been used to describe the shift of a disease pattern in a developing country from infectious to noninfectious (*2*). This shift is considered to parallel increased industrialization and improved economic conditions. Recent studies, however, have indicated that high rates of injury mortality and morbidity are present in developing countries at rates similar to those in industrialized countries, even when mortality and morbidity from endemic infectious disease are high (*3,4*). Injuries occur among persons of all ages and both genders, although young persons, males, and the economically disadvantaged are most affected. This report discusses some of the epidemiologic, methodologic, and policy considerations that relate to the implementation of injury surveillance programs in developing countries.

INJURY AS A PUBLIC HEALTH PROBLEM IN DEVELOPING COUNTRIES

Although targeted injury-prevention activities have been introduced in some developing countries, broad-based public or private programs to prevent injuries have not yet been established. Two reasons may account for this lack. First, most available public health attention and resources in developing countries have been directed toward the prevention of infectious disease and the promotion of child survival activities. Second, policy makers and public health officials in developing countries do not consider injuries to be a public health problem or a preventable condition—possibly because of the failure of existing health-information systems to identify injuries as a major cause of mortality, morbidity, and economic costs and to target possible prevention and control measures.

In developing countries, injuries have a substantial effect on the public's health and on quality of life. For example, in China, the overall death rate from injuries is similar to that in the United States (69.0 vs. 61.3/100,000 in 1986) (*3*). Thailand's rate in 1983 was 58.3/100,000 (*5*). Injuries are the leading cause of hospitalization in

Indonesia and in Egypt. In Thailand, Malaysia, and Singapore, fatal injuries from motor vehicles result in more years of potential life lost (YPLL) than do malaria and tuberculosis combined (*6*). In rural Papua New Guinea, injuries for persons ages 15–44 years are the leading cause of death, and in two rural villages, the injury mortality rate was 90–95/100,000—substantially higher than rates in industrialized countries (*4*).

Crude death rates from traffic collisions are often higher in developing than developed countries. Motor vehicle death rates per 100,000 population in Botswana, Cameroon, and the Republic of South Africa are equal to or greater than that of the United States. When adjustments are made for the number of vehicles, the difference is even more dramatic. In developing countries, the number of fatalities per 1,000 motor vehicles is generally 10 to 20 times greater than in industrialized countries; in Ethiopia and Nigeria, the fatality rate per 1,000 motor vehicles is 50 times greater than that in the United States or the United Kingdom (*7*). The impact of injuries becomes even greater as morbidity and mortality due to infectious disease decrease. In Mexico, the proportion of deaths from infectious disease declined from 43% to 17% in the period 1955–1980. In this same period, the proportion of deaths from unintentional injury increased from 4% to 11% (*8*).

Intentional injuries are also important problems in developing countries. For example, China's suicide rate is nearly double that of the United States (21.8 vs. 12.8/100,000). In China, the suicide rate among females ages 15–24 is more than 10 times the rate for U.S. females ages 15–24 (*3*). High rates of suicides are also apparent in Thailand and Indonesia. Thailand's homicide rate was 14.6/100,000 in 1984, 1.5 times larger than that in the United States (*5*).

DATA SOURCES IN DEVELOPING COUNTRIES

Although injury surveillance methods are similar in developed and developing countries, in developing countries, considerations of cultural, social, political, and resource availability may hamper the collection, analysis, and interpretation of surveillance data and may influence the way in which surveillance is conducted. For example, the availability of data varies greatly among countries. Although a developing country may collect vital records data, such data may not be tabulated in a timely manner or may not be available to public health researchers.

In developed countries, sources of injury surveillance data usually available in the health-care system include vital statistics, hospital discharge summaries, and specialized health-survey data (*9*). In developing countries, however, these sources may not be useful for injury surveillance for a variety of epidemiologic, medicolegal, financial, and administrative reasons.

Accurate, accessible, and timely vital statistics—especially death certificate data—are essential for estimating the impact injury fatalities have on YPLL. In most developing countries, however, these mortality data are neither complete nor accurate enough to be useful. In some countries, no vital statistics data are collected at the national level. In others, these data are collected from a variety of sources such as traffic police, security police, and health departments, but the data from these sources are not compared and total death counts may be disparate. For example, in Egypt, the traffic police conduct an at-the-scene investigation of all road traffic fatalities. These crash reports are tabulated by the national planning agency, and an annual traffic report is produced. The Ministry of Health (MOH), through its civil registration unit, issues death certificates for all deaths and submits tabular summa-

ries of this information to the national planning agency. These tabulations are derived from cause of death listed on death certificates and are used to provide annual vital records reports that are used for health planning. However, in 1987, the traffic police report listed 5,181 fatalities associated with motor vehicles, whereas the MOH report listed 3,248 such fatalities (*10, unpublished data*). The discrepancies in these data have not been explained or reconciled.

A second problem with data from death certificates is the failure of the certifying officer (depending on the system, usually either a physician or a clerk) to describe the cause of death accurately. Deaths from injuries could be attributed, e.g., to "hemorrhage" or "cardiovascular collapse" rather than to the underlying cause of death, such as "fall" or "road-traffic crash." Often the cause of death is listed as "injury" without the provision of any specifics regarding the means or type of injury. In Egypt, for example, an effort to validate registered causes of death determined that half the deaths from injury among children were misclassified under other causes (*11*).

Deaths and several types of injuries are frequently not reported to health authorities for medicolegal reasons. In some countries, certain injuries require a police investigation to determine fault, rather than simply the causation. As a result, persons who are injured as a result of a burn or a fall may not seek medical treatment. Other injuries, such as drowning, may be considered "blameless" and do not require official police or medical determination of the cause of death. Cultural and medicolegal concerns may account for the seemingly low rate of assault injuries and the low number of homicides and suicides officially reported.

Another barrier to seeking medical treatment is the inability of the health-care system to provide adequate medical care or of the injured person and his/her family to afford treatment. Treatment for burns is expensive; therefore, many such injuries are treated at home rather than in a hospital. The result is an underreporting of burn injuries, but an increased case-fatality and complication rate for persons with burns who are eventually admitted for hospital care.

Finally, health-care resources in developing countries are usually insufficient to support the periodic collection, analysis, and feedback of information on injuries. This continues the "vicious circle" of underestimation of the impact of injury in a population and increases the inevitability that those responsible for the certification of cause of death or the tabulation of vital records, hospital, and emergency room data will not get the feedback needed to modify their systems to enable them to properly collect, code, and tabulate their data.

PLANNING SURVEILLANCE FOR INJURIES IN DEVELOPING COUNTRIES

As is the case in industrialized countries, several basic principles influence the design of a surveillance system for injuries in developing countries (*12*).

- First, the design depends most importantly on the purpose of the surveillance and the realities associated with the setting in which the surveillance is to be conducted. The case definition, frequency of data collection and analysis, and the data sources selected depend on the objective for conducting surveillance. A surveillance system designed to measure the impact of fatal injuries on YPLL may have entirely different case definitions, data sources, and reporting requirements than a surveillance system designed to measure the impact of road traffic injuries in a rural area. In countries with no telecommunications infrastructure,

surveillance data must be conveyed through the postal or telephone system, which has the effect of curtailing the scope and direction of surveillance efforts.

- Second, injury surveillance should not be used in lieu of a case investigation to determine risk factors or identify high-risk groups. Case investigations may be derived from data obtained in surveillance but should be implemented separately from ongoing surveillance for injuries.
- Third, a minimal data set should be used for surveillance for injuries. Often there is a tendency to collect too much data on too many variables, increasing not only the cost of surveillance, but also expectations about the usefulness of the surveillance system. In addition to the assessment of risk factors, surveillance should be used to develop and evaluate prevention programs.
- Finally, local data should be used for surveillance for injuries. Although national data, when available, are useful for directing policy and helping to implement important legal and programmatic changes, local sources of data must be used to shape local injury-prevention programs.

Purposes of Surveillance for Injuries

In most developing countries, implementation of population-based surveillance for injuries would provide needed information to policy makers and public health officials for instituting injury control and prevention efforts. Other primary purposes for surveillance are to target specific injuries for intervention and to evaluate the impact of an intervention for a specific injury, such as introducing pedestrian walkways or promoting the use of bicycle helmets.

Case Investigation versus Surveillance

The specific purpose(s) of a surveillance system must be considered in all planning and implementation activities, and the data sources and data elements collected must be chosen to meet only those purposes. Surveillance forms should be designed so that all data items are on one page, that information flows naturally from data element to element, and that no excessive amounts of time or administrative effort are required of persons who complete the forms. For injury control and prevention, surveillance systems are less appropriate for detecting risk factors than are case investigations.

Data Elements

In order for data from injury surveillance to be comparable within a particular jurisdiction—and throughout the world—data variables for surveillance of injuries should be standardized and collected in this standard format. The World Health Organization Collaborating Centers for Injury Control are developing such a standard. Besides standardizing data variables, consideration should be given to establishing a minimum data set for surveillance for injuries. This minimum data set would comprise the data items needed to determine the impact of injuries in a particular area.

Often there is confusion over the terminology used for data collection in surveillance for injuries. "Cause of injury" could mean to some **the object** that caused an injury (knife, blunt object), while to others it could be **the means** of injury (self-

inflicted, unintentional, assault). A glossary of terms to be used in describing and reporting injuries should be developed to accompany the injury surveillance protocol.

Data Sources

Although, as previously discussed, traditional health system-based data sources may not by themselves be useful for surveillance for injuries, several steps can be taken to validate or improve their usefulness. For instance, if resources can be allocated for this purpose, to estimate the amount of misclassification of cause of death on death certificates, a verbal autopsy study can be conducted and a sample of relatives of the decedents can be interviewed to determine the cause(s) of death more accurately. Sentinel sites for mortality and morbidity surveillance can be established. For example, data from sentinel health centers in China have been used to prepare a national estimate of the impact of injury on health (*3*).

Sources of data should be defined by the purposes of surveillance. For example, if a surveillance system has been established to evaluate the effectiveness of a campaign to promote the use of helmets for cyclists, which have been shown to be effective in reducing injuries associated with cycle crashes, ongoing surveys for helmet usage would be an adequate source of data.

Local Sources

The distribution of injuries varies in relation to several factors, including target groups, economics, and geography. For example, in Thailand national statistics indicate that drowning is the cause of a substantial proportion of injury-associated mortality. However, because drownings occur primarily in the regions along rivers and along the Gulf of Thailand, national mortality data are not a suitable basis for designing and implementing a drowning-intervention program. Similarly, evaluation of such a program should be conducted in the regions in which the intervention program has been implemented.

CONCLUSION

A multitude of activities must take place to help establish a useful injury surveillance system in a developing country, but none is more important than providing the basis for establishing a clear-cut policy at the national level to the effect that injuries represent an important, but preventable, health problem. This report provides a basis for establishing priorities for surveillance for injuries in developing countries; injury prevention in these countries will require effective integration of public health surveillance activities with epidemiologic studies, program implementation, and evaluation efforts.

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The Surveillance Challenge: Final Stages of Eradication of Poliomyelitis in the Americas

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Summary

Current levels of surveillance have contributed to substantial reductions in morbidity and mortality due to poliomyelitis in the Americas. Despite the success of the poliomyelitis eradication initiative, it has become critical that surveillance be intensified so that the absence of wild poliovirus circulation can be verified with confidence in countries not reporting confirmed cases of poliomyelitis. Cases of acute flaccid paralysis continue to be classified as compatible with poliomyelitis, because investigations of such patients do not provide sufficient information to rule out wild poliovirus as the cause of paralysis. At this stage of the eradication initiative, the presence of compatible cases in some countries in Latin America indicates a failure of the surveillance system. The greatest challenge for the eradication initiative may be correcting the remaining deficiencies of the existing surveillance system that hinder efforts to verify that wild poliovirus is no longer being transmitted in the Americas.

INTRODUCTION

Poliomyelitis is on the threshold of being eradicated from the Western Hemisphere (*1*). Despite a doubling in the number of reported cases of acute flaccid paralysis (AFP) in 1991 compared with 1985 (from approximately 1,000 AFP cases in 1985 to over 2,000 in 1991), the number of confirmed cases[§] has steadily declined, reaching record lows each year from 1986 through 1991. During 1991, only nine AFP cases were confirmed by culture as poliomyelitis caused by wild-type poliovirus (*2*). This success has been linked to the substantial political and social will generated by the thousands of health workers and civil servants who have contributed to this effort from every level of society (*3-5*).

[§]Before 1990, a case of AFP was "confirmed" as poliomyelitis if there was a) laboratory confirmation (wild-type poliovirus isolated from the stool), b) epidemiologic linkage to another case of AFP or to a confirmed case of poliomyelitis, c) residual paralysis 60 days after onset of symptoms, d) death, or e) lack of follow-up of a case. Cases of AFP were "discarded" if they did not meet these criteria. To increase the specificity of the case definition, beginning in 1990 a case of AFP was "confirmed" only if it was associated with wild-type poliovirus isolation. Cases of AFP associated with residual paralysis, death, or lack of follow-up were classified as "compatible" poliomyelitis; however, if two adequate stool specimens were negative in three different laboratories, cases could be "discarded" as not poliomyelitis.

Surveillance for eradication of wild poliovirus transmission relies on the identification of children with AFP. Because AFP has multiple causes (including Guillain-Barré syndrome and transverse myelitis), laboratory isolation of wild poliovirus from the stools of children with AFP is necessary for confirmation of wild poliovirus transmission. However, relying on AFP identification underestimates the extent of wild poliovirus transmission among asymptomatically infected persons. For every child afflicted by paralytic poliomyelitis, approximately 200 children may be infected with wild poliovirus but do not become paralyzed. Therefore, for eradication of transmission of wild poliovirus, it is crucial that all cases of AFP be detected and investigated and that the appropriate control measures, including vaccination, be implemented immediately.

Since its inception in 1985 (*6*), the poliomyelitis eradication initiative in the Americas has been confronted with a number of motivational issues. Eradication is an "all-or-nothing" phenomenon; high standards of performance must be maintained even after the final confirmed case has been reported. Initially, field workers responsible for maintaining surveillance were highly motivated to participate in the eradication program, which has an inherently well-defined goal. However, as the number of wild poliovirus isolates has been reduced each year and the geographic distribution has become limited to fewer countries (only Colombia and Peru in 1991), the need to motivate public health workers to maintain or achieve even higher standards of surveillance takes on increasing importance. The success of augmented surveillance during these late stages of the eradication initiative will be critical for verification of the absence of wild poliovirus circulation in the majority of countries not reporting confirmed cases of poliomyelitis.

This report summarizes the descriptive epidemiology of compatible poliomyelitis cases reported to the Pan American Health Organization (PAHO) for 1990 and 1991, with special focus on the cases from 1991, and describes the challenge PAHO faces in its attempts to accelerate and strengthen surveillance activities.

METHODS

AFP among children $<$15 years of age is a reportable disease in all countries of Latin America. For all such cases, PAHO recommends that two stool specimens (each $>$10 g) be obtained within 15 days of onset of paralysis to test for the presence of wild poliovirus. The quality of surveillance is measured largely by the incidence of reported cases of AFP and the proportion of AFP cases associated with adequate and timely specimen collection.

To minimize the erroneous classification of cases of AFP as poliomyelitis, in 1990 PAHO implemented a revised case definition for poliomyelitis. To increase specificity, confirmed cases were redefined as only those cases of AFP associated with wild poliovirus isolation. A separate category, termed "compatible" poliomyelitis cases, included those patients with AFP from whom no wild poliovirus was isolated, but who had clinically compatible residual paralysis at 60 days, had died, or who had been lost to follow-up but from whom two adequate stool specimens had not been obtained within 2 weeks after the onset of paralysis.

PAHO analyzed cases of AFP classified as poliomyelitis reported from the countries of Latin America to the Office of the Expanded Program on Immunization (EPI) of

PAHO from week 1 of 1990 through the last week of 1991, with particular focus on the compatible poliomyelitis cases reported in 1991. Compatible cases from 1991 were also characterized by risk factors for the presence of wild poliovirus transmission, including age <6 years and fever at onset of paralysis, and whether the patients lived in an area of recent wild poliovirus transmission (*7,8*; unpublished data, Dietz). Because all patients with suspected paralytic poliomyelitis must have AFP to be included in the PAHO polio surveillance system, the presence of AFP is, by definition, 100% sensitive for detecting paralytic poliomyelitis, but is not specific. However, an analysis comparing wild poliovirus-confirmed poliomyelitis cases with all other cases of AFP that occurred in 1989–1990 revealed that the presence of two characteristics, i.e., age <6 years and fever at onset of paralysis, increased the specificity for detecting confirmed poliomyelitis to 73% (*8*). Therefore, for the 1991 data, compatible cases affecting children determined to be <6 years of age with fever at onset of paralysis were then analyzed by geographic location, with particular emphasis on areas with recent wild poliovirus circulation.

RESULTS

In 1990, 18 confirmed and 71 compatible poliomyelitis cases were reported in the Region of the Americas. Of the 71 patients with compatible poliomyelitis, 12 (17%) had died, 15 (21%) were lost to follow-up, and 44 (62%) had residual paralysis. Stool specimens from all 71 patients with compatible cases were inadequate to rule out wild poliovirus infection. The average age of patients with compatible poliomyelitis was 3 years; 55% were male.

During 1991, 9 confirmed and 29 compatible poliomyelitis cases were reported. Of the 29 patients with compatible poliomyelitis, 10 (35%) had died, 5 (17%) were lost to follow-up, and 11 (65%) had residual paralysis. All 29 patients with compatible cases had stool specimens inadequate to rule out wild poliovirus infection. The average age of patients with compatible poliomyelitis was 5 years; 65% were male.

The rate of reported cases of AFP per 100,000 population <15 years of age in Latin America decreased from 1.5 during 1990 to 1.4 during 1991. This rate is an approximate indicator of the sensitivity of surveillance for AFP and, in general, should not decline below 1.0 per 100,000 population <15 years of age per year. Although the proportion of patients with reported cases of AFP with two stool samples obtained within the first 15 days after onset of paralysis increased from 48% during 1990 to 57% during 1991, official certification of countries requires that 100% of patients with AFP have two adequate stool specimens obtained within 15 days of onset of paralysis for at least 3 years after the last reported confirmed case of poliomyelitis in the region (*9*).

During 1991, nine countries reported compatible cases (Figure 1). With the exceptions of Argentina and Nicaragua, all other countries that reported compatible cases (Brazil, Colombia, Ecuador, Guatemala, Mexico, Peru, and Venezuela) have had documented wild poliovirus circulation within the last 3 years.

Of the 29 compatible cases reported in 1991, nine (31%) affected children <6 years of age who were febrile at onset of paralysis. Of the nine compatible cases with risk factors for wild poliovirus, four occurred in areas that had documented wild poliovirus transmission within the previous year (Colombia, Ecuador, and Peru) and five within 2 years (Venezuela and northeastern Brazil) (Figure 2).

FIGURE 1. Compatible poliomyelitis cases — Region of the Americas, 1991

FIGURE 2. Patients with symptoms compatible with poliomyelitis, associated with age <6 years and fever at onset of paralysis — Region of the Americas, 1991

DISCUSSION

The data indicate that to eradicate poliomyelitis in the Americas and to be certain of the achievement of this goal, surveillance must be improved. Critical surveillance indicators, such as those measuring the sensitivity of the system (i.e., the rate of AFP per 100,000 population <15 years of age per year) or the quality of case investigations, are not improving or are far from achieving the standards put forth for official certification of poliomyelitis eradication (*9*). As the numbers of wild poliovirus isolates diminish, any reduction in the previous levels of surveillance may undermine previous accomplishments. Because surveillance information directs action (e.g., vaccination campaigns that prevent spread of disease), "polio-free" countries with otherwise poor surveillance are at risk for imported cases of poliomyelitis, particularly the countries near Colombia and Peru. Large outbreaks of poliomyelitis may also occur when children still susceptible to poliovirus infection are concentrated in areas that do not have good information on which to base interventions.

"Polio-free" countries with no wild poliovirus transmission since 1989 present a unique problem. Because of recent transmission, these countries are also at risk for sporadic paralytic disease; however, because surveillance is poor, transmission may not be detected.

At this stage in the eradication initiative, the continued occurrence of compatible poliomyelitis cases among children <6 years of age with fever at onset of paralysis in five countries during 1991 is of great concern to the program. To that end, the program has directed urgent attention toward improving surveillance (e.g., more aggressive AFP case-detection measures to improve the sensitivity of surveillance and more aggressive AFP case evaluation to improve the likelihood of wild-type poliovirus isolation) in Brazil, Colombia, Ecuador, Peru, and Venezuela.

In addition to the public health concerns described above, accurate, complete surveillance information is necessary for countries to be certified as free of poliomyelitis. The International Certification Commission, established by PAHO in 1990, requires for certification that, for at least 3 years after the last wild poliovirus isolate in the region, all cases of AFP be investigated within 24 hours of being reported and that at least two stool samples be collected from each patient with AFP within 15 days of the onset of paralysis (*9*). Because wild poliovirus circulation cannot be ruled out, the occurrence of compatible cases clearly represents a failure in the surveillance system and will prevent countries from being certified as free of poliomyelitis.

Unexpected public health catastrophes have contributed to the diversion of attention and resources from the initiative to eradicate poliomyelitis. For example, the cholera epidemic, which began in January 1991 in Peru and has since spread throughout almost all of Latin America, has resulted in over 200,000 cases, and represents the single largest epidemic of cholera in the world this century. In Colombia, where surveillance detected an outbreak of poliomyelitis on the Atlantic coast during 1991 (eight confirmed cases), control measures consisting of house-to-house vaccination for poliomyelitis were conducted in conjunction with the distribution of information about cholera prevention (*2*). These measures brought together diverse experts from different departments (EPI, Environmental Sanitation, and Diarrhea Control) of the Ministry of Health to work in an integrated fashion toward common health goals. These actions have since sparked renewed interest in and commitment to poliomyelitis eradication from previously uninvolved elements of the health sector.

Ultimately, the greatest challenge for the program will be to develop new strategies for reharnessing the intense commitment to polio eradication, which has been largely responsible for previous successes, and innovative approaches to close the remaining gaps and correct the deficiencies in the existing surveillance system. To that end, PAHO will continue to pursue alternative approaches to bolster surveillance of AFP, such as the integration of poliomyelitis field work with that of cholera prevention.

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Surveillance for Epidemic Cholera in the Americas: An Assessment

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Summary

In January 1991, epidemic cholera appeared in Peru and quickly spread to many other Latin American countries. Because reporting of cholera cases was often delayed in some areas, the scope of the epidemic was unclear. An assessment of the conduct of surveillance for cholera in several countries identified some recurrent problems involving surveillance case definitions, laboratory surveillance, surveillance methods, national coordination, and data management. A key conclusion is that a simple, well-communicated cholera surveillance system in place during an epidemic will facilitate prevention and treatment efforts. We recommend the following measures: a) simplify case definitions for cholera; b) focus on laboratory surveillance of patients with diarrhea primarily in the initial stage of the epidemic; c) use predominantly the "suspect" case definition when the number of "confirmed" cases rises; d) transmit weekly the numbers of cases, hospitalized patients, and deaths to regional and central levels; e) analyze data frequently and distribute a weekly or biweekly summary; and f) report the number of cholera cases promptly to the World Health Organization.

INTRODUCTION

Background

Cholera is a highly preventable and treatable disease. Chlorinating water supplies and implementing other emergency measures can prevent transmission, and providing ready access to oral and intravenous rehydration therapy can dramatically lower death rates. Prevention and treatment efforts can function optimally when there is cooperation between regional and central public health offices, as well as at national and international levels. The movement of the cholera epidemic, the need for supplies, and the effectiveness of control measures are better assessed with a clear and representative picture of the epidemic. A simple, widely accepted, well-described surveillance system is the best means of obtaining that epidemic picture.

After January 1991, when epidemic cholera first appeared in Peru, the disease quickly spread to many other Latin American countries (*1,2*). Because this epidemic was unexpected, some countries had little time to prepare for it. However, many countries had already drafted and implemented preparedness plans for the control of cholera.

An ideal plan for cholera control has several essential components, including health education, environmental sanitation, clinical management, laboratory diagnosis, epidemiologic investigation, and surveillance (*3*). During a cholera epidemic, surveillance is essential to estimate the incidence and the fatality rate, to assess the movement of the epidemic, to plan the distribution of supplies for treatment and prevention, to plan timely epidemiologic investigations, and to determine the effectiveness of control measures.

During investigations of the cholera epidemic in many countries, epidemiologists from CDC have identified several recurrent problems with cholera surveillance, including difficulties with collection, transmission, and analysis of data. These problems often have caused delays and obscured the scope of the epidemic regionally, nationally, and internationally. In addition, some national surveillance systems for cholera use elaborate, complex case definitions that hinder smooth, rapid reporting of cases. This report outlines selected problems that characterize cholera surveillance systems in some Latin American countries and includes recommendations to facilitate cholera surveillance both nationally and internationally.

SURVEILLANCE ISSUES AND RECOMMENDATIONS

Case Definitions

One common problem with cholera surveillance is the case definition. A case definition is a set of objective criteria (symptoms, signs, and laboratory data) that lead to a reliable, reproducible report of the disease. In defining cases, many countries use two main categories of cases of cholera—"suspect" and "confirmed." Often, within each main category, multiple case definitions are used. One country, for example, uses three definitions for a "suspect" case of cholera: a) profuse diarrhea, with severe dehydration, affecting a person ≥5 years of age; b) acute diarrhea in an area with confirmed cholera; and c) acute diarrhea affecting a person who traveled through an infected area within 5 days before onset of illness. In another country, only one definition is used for a "suspect" cholera case: acute diarrhea affecting a person ≥5 years of age; however, this country also uses the additional category of "probable" cholera case, defined as dehydrating diarrhea, vomiting, cramps, and malaise affecting a person epidemiologically associated with other cholera cases. Multiple definitions such as these increase the difficulty of reporting and are likely to confuse the analysis of surveillance data.

Most countries use 5 years as the lower age limit for cholera surveillance. Although the World Health Organization (WHO) has previously recommended 10 years as the lower age limit for initial identification of cholera (*3*), changes to lower this age are in progress (Dr. J. Tulloch, Director, Division of Diarrhoeal and Acute Respiratory Disease Control, WHO, personal communication). Five years is a useful lower age limit since it corresponds with the transition from preschool to school age; schoolchildren may be more likely to be exposed to some communicable diseases, including cholera, than are younger children. For most countries, much of the morbidity from all causes of diarrhea occurs in the <5-year age group (*4*). Using 5 years as the lower age limit in a cholera case definition excludes more of the cases of diarrhea that are not cholera and, in effect, renders the definition more specific.

The other main category, the confirmed case, is usually defined as *Vibrio cholerae* O1 infection verified by laboratory methods. The most commonly used method is

stool culture, with confirmation that the isolate is O1 *V. cholerae*. Where infection is extremely rare, it can be helpful to demonstrate that the isolate produces cholera toxin, because some nontoxigenic O1 strains of *V. cholerae* have been documented (*5*). Serologic diagnosis, based on measurement of acute- and convalescent-phase titers of vibriocidal or antitoxin antibodies, is available, although rarely used. Simply counting laboratory isolates as cases may obscure the true picture of the epidemic. In one country, for instance, routine culturing of specimens from family members and close contacts of patients with previously confirmed cholera identified some persons with asymptomatic infections. These asymptomatic persons were then reported as having confirmed cholera cases. In fact, asymptomatic cholera infections are numerous in epidemics, but cannot be identified as cases by clinical signs and symptoms alone. Reporting persons without diarrhea as confirmed cholera case-patients can distort surveillance data.

The major difficulty with simple case definitions for cholera lies in the broad spectrum of illness associated with this infection. Over 70% of infected persons are asymptomatic, and an additional 15%–23% of infected persons have mild or moderate nonbloody diarrhea similar to diarrhea from other causes. Some persons who meet a "suspect" case definition may not have cholera, although they are likely to represent only a small proportion of the reported cases in the epidemic setting. A case definition based solely on an adult cholera patient's having dehydrating diarrhea (approximately 2%–5% of those infected) will be more specific than a case definition based on patients with any type of diarrhea, but will also miss many infected persons. In the context of public health action, an accurate report of the number of symptomatic infections is a more useful measure. No single case definition is perfect; a balance is needed between sensitivity and specificity to provide a representative picture of the epidemic in any given area.

Recommendations

For surveillance in a cholera epidemic, a case definition should be brief and simple to facilitate uniform and rapid reporting of cases. To simplify case reporting, cholera case definitions should be limited to two categories, the "confirmed" case and the "suspect" case. A confirmed cholera case is laboratory-confirmed *V. cholerae* O1 infection of any person who has diarrhea. In the epidemic setting, we suggest that a suspect case of cholera be defined as acute, watery diarrhea affecting a person ≥5 years of age.

Laboratory Confirmation and Environmental Surveillance

The laboratory is a central component of cholera surveillance. It is essential for confirming that *V. cholerae* O1 has arrived in an area and is infecting humans, for monitoring its continued presence or documenting its disappearance, for determining its antimicrobial susceptibilities, and for identifying its presence in the environment. Preliminary isolation and confirmation of *V. cholerae* O1 require trained personnel using thiosulfate-citrate-bile salts-sucrose (TCBS) agar and polyvalent antisera (*6*). In the current cholera epidemic in Latin America, most countries were able to staff some laboratories with trained personnel and minimal supplies shortly after the first few cholera cases had been confirmed. However, as epidemic cholera advanced, many laboratories were quickly overwhelmed with demands for confirmation of numerous suspect cholera patients. Reporting of laboratory results slowed because of this increased amount of work.

Recommendations

In regional laboratories, trained personnel are needed to confirm *V. cholerae* O1 infection using TCBS agar and polyvalent antisera. At the central laboratory, trained personnel are also needed to confirm field isolates.

Initially, for an area threatened with cholera, a sample of persons with suspect cases should have specimens taken for culture. After a sufficient number of suspect cases have been confirmed to indicate that cholera is epidemic in that area (e.g., 10–20), the local or regional laboratory may then reduce the frequency of performing cholera stool cultures from that area (e.g., 10 specimens/month) to confirm the continuing presence of *V. cholerae* O1 and to monitor its antibiotic susceptibility. Every laboratory that identifies *V. cholerae* O1 should provide weekly reports of the total number of patient isolates to designated regional and central offices.

In locations where cholera has not been confirmed, especially those bordering areas with cholera, Moore swabs (*7*) can be placed in the sewage effluents of a limited number of sentinel towns and cities every 1–3 weeks. If *V. cholerae* O1 is isolated from sewage or from a person in a given area, the presence of the organism in the area has been established, and the surveillance with Moore swabs can be discontinued. Thereafter, laboratory-based surveillance in that area should focus on patients with diarrhea.

When *V. cholerae* O1 is identified in a country for the first time, the isolate should be referred to an international reference laboratory for confirmation and further characterization (e.g., using molecular biological techniques), which may be helpful in determining its origin.

Stages of Surveillance

When epidemic cholera appears in a region, two stages of surveillance are observed: an early stage, when cultures are obtained from many patients with diarrhea to diagnose cholera, and a later stage, when cholera is firmly established in the region and larger numbers of people are ill. In the early stage, the number of persons with confirmed cases may be small and may represent a minor proportion of the persons with suspect cases. Most countries report only culture-confirmed cases at this stage. However, as the cholera epidemic grows, more cases are confirmed, and the number of patients with suspect cases more accurately reflects the cholera situation in that area. Many countries, nonetheless, continue to report only culture-confirmed cases in this later stage of cholera surveillance, because of concerns about public response and adverse economic consequences if the larger number of suspect cases is reported.

Recommendations

In a cholera-threatened area, available diarrhea surveillance data can be reviewed to detect trends suggesting early cholera outbreaks. Any report of acute dehydrating diarrhea affecting a person ≥5 years of age should immediately alert local public health workers to investigate for possible cholera. Early in a cholera epidemic when small numbers of cases are being confirmed, a region may report only culture-confirmed cases. However, when the number of confirmed cases becomes sufficiently high, surveillance should shift to using the "suspect" case definition because it allows simpler, more timely, and more accurate reporting, and because it avoids overburdening laboratory resources. For a region in this later stage of cholera surveillance, it may be appropriate to limit culturing to a sample of the suspect cases

that should continue to be reported. The decision as to when the number of confirmed cases becomes sufficiently high to change from reporting only confirmed cases to reporting cases in both "suspect" and "confirmed" categories should be made promptly on an individual basis after all implications have been assessed. Since most cholera outbreaks are large and often well established when confirmed, early shifting to reporting suspect cases may be more appropriate.

When the cholera epidemic wanes and the number of infections decreases to the level of the early stage of the epidemic, some countries may revert to reporting only confirmed cases. However, in many areas, cholera appears seasonally, with numbers of cases increasing in warm months and decreasing in cold months. Therefore, it may be useful to report suspect cases for at least a year after the epidemic wanes, until it is clearly shown that cholera is controlled in an area. At that time, it is reasonable to return to reporting only confirmed cases for that area.

Information from Patients with Cholera

Some countries have administered lengthy, detailed questionnaires to every patient with cholera. In one country, the information about the patient on the questionnaire included demographic data, clinical signs and symptoms, laboratory results, characteristics of the feces and vomitus, travel history, food history, contact history, and additional comments by the person filling out the questionnaire. Although detailed information may be helpful in describing a sample of cholera cases clinically, it is of epidemiologic interest only in the earliest phase of an epidemic. Thereafter, as the number of cholera cases increases, the forms may be incomplete or ignored, and much of the data will be unmanageable and unanalyzed unless data-handling resources are diverted from other worthwhile programs. Exposure information collected from patients alone will not determine the modes of transmission, because cholera may be transmitted by common foods or beverages or by multiple sources that vary from place to place. Well-designed and well-administered case-control investigations in affected areas are a more effective approach to identify vehicles of transmission. In summary, lengthy surveillance questionnaires waste scarce human resources and impede handling of surveillance data.

Recommendations

For cholera, exposure histories are best reserved for investigations. Surveillance should be streamlined, using simple case definitions and concentrating on timely and accurate reporting of data. At the local level, including all treatment centers, information gathered about patients who meet the cholera surveillance case definition should be basic, including age, gender, date treated, and home address. The information transmitted to regional and central levels may include age, gender, and location, but it should primarily focus on the numbers of cases, hospitalized patients, and deaths.

Communication, Analysis, and Timely Reporting of Surveillance Data

Surveillance and laboratory information is of little value unless it is communicated clearly and promptly. Timely reporting of laboratory results to a regional epidemiology office will allow early identification of cholera-affected areas and permit immediate investigations; timely reporting to the central laboratory will allow early confirmation of the isolates; and, to complete the information loop, timely feedback to the original submitter of the isolates will help validate diagnoses and improve

patient care. Similarly, timely reporting of the total number of cases and basic analysis results from a central epidemiology office back to the laboratories and regional epidemiology offices is essential to allow the epidemic to be characterized and to ensure continued cooperation at all levels. In some locations, information dissemination among these major components in the surveillance process sometimes has not been timely and complete. Early in the cholera epidemic in Latin America, for example, some countries instituted emergency daily reporting of the number of cases to a central office, yet did not communicate the total and cumulative number of cases by region to their constituents until months later. The suitable form of information flow among local and central levels must be worked out country by country.

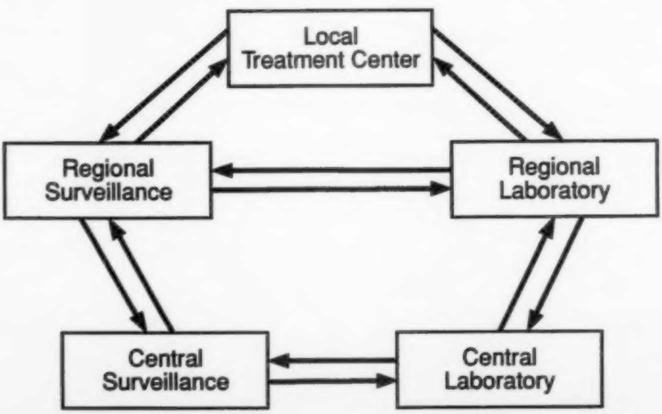
Recommendations

A proposed communication system includes both reporting to a central office and feedback to regional offices (Figure 1).

Initially, treatment centers and regional offices may wish to report to the central office daily by a rapid method (e.g., radio, telephone, telegram) the number of suspect cases, the number of confirmed cases, the number of patients who were hospitalized, and the number who died. A rapid switch to weekly reporting will often reduce the burden of work created by daily reporting without compromising the main goals of surveillance. The administrative level to which each treatment center's report should be sent must be clearly identified.

Surveillance data should be analyzed promptly and frequently. Basic tabulation and comparison of data should be performed at the local and regional level if trained personnel are available. At the central level, epidemiologists should analyze reports of suspect and confirmed cholera cases by region and by week to track the spread of the epidemic, to determine whether unexpectedly large numbers of cases are occurring in any region, and to evaluate the impact of interventions. The results should be disseminated to all levels and used to estimate resources needed at local levels and to decide whether epidemiologic investigations are needed. When surveil-

FIGURE 1.



lance data suggest an increase in the number of cases in an area, an epidemiologic investigation should be conducted to determine the modes of transmission and identify further prevention measures. The results of these investigations should be reported to all categories of participants in the surveillance system.

International Reporting

Cholera is one of three internationally notifiable diseases, and countries are requested to report cases to WHO promptly. Some governments may be concerned that reporting a large number of cases could have a detrimental impact on economic factors such as tourism and food exportation. Prompt and accurate reporting, however, will improve national and international efforts to allocate resources to control cholera morbidity and mortality.

Recommendations

The number of cholera cases should be reported to WHO in a timely manner.

Summary of Recommendations

Case definitions for cholera

- In a cholera epidemic, use only two categories, "suspect" and "confirmed."
- Define a suspect case as acute, watery diarrhea affecting a person ≥5 years of age.
- Define a confirmed case as laboratory-confirmed *Vibrio cholerae* O1 infection of any person who has diarrhea.

Laboratory confirmation and environmental surveillance

- Use trained personnel in regional and central laboratories to isolate and confirm *V. cholerae* O1.
- Confirm the diagnosis bacteriologically of several suspect cases in newly threatened areas.
- After cholera has become established in an area, use stool cultures only to confirm the continuing presence of *V. cholerae* O1 and to monitor its antibiotic susceptibility.
- Consider using Moore swabs to identify *V. cholerae* O1 in sewage in cholera-threatened areas where cholera has not been confirmed.

Stages of surveillance

- In a cholera-threatened area, investigate cases of acute dehydrating diarrhea affecting persons ≥5 years of age.
- When the number of "confirmed" cases rises, shift to using primarily the "suspect" case definition.
- Continue to report suspect cases for at least 1 year after the epidemic wanes.

Information from patients with cholera

- Refrain from using lengthy surveillance questionnaires.
- Collect basic information on patients at the local level.
- Transmit summary data (primarily the number of cases, hospitalizations, and deaths) to the central level.

Communication, analysis, and timely reporting of surveillance data

- Report surveillance results to a central office weekly by a rapid method.
- Analyze surveillance data and disseminate surveillance reports to all components of the surveillance system quickly and frequently.
- Conduct epidemiologic investigations in areas with increasing numbers of cases.

International reporting

- Accurately report the country's cholera situation to WHO in a timely manner.

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The National Surveillance System for Sexually Transmitted Diseases in Italy

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Summary

Sexually transmitted diseases (STDs) have increased in importance in recent decades as a result of their wider dissemination, the emergence of new etiologic agents, and changes in sexual behaviors. In Italy, gonorrhea and syphilis are among the 71 diseases for which reporting is legally mandated. Despite these legal requirements, however, considerable underreporting has been documented. The need for more reliable data has led to the establishment of a formal sentinel surveillance system for STDs. The Italian National STD Surveillance Network, which involves 47 reporting centers, was established in 1990. A total of 5,049 patients were reported during the pilot study and the first 6 months of surveillance. For men, the most frequently reported diseases were genital warts and nongonococcal urethritis; for women, the most frequent diagnoses were nonspecific vaginitis and genital warts. The objectives of this system are threefold: a) to obtain a rapid and accurate assessment of the occurrence and spread of STDs; b) to identify trends in disease occurrence; and c) to monitor changes over time by geographic area.

INTRODUCTION

Sexually transmitted diseases (STDs) have increased in importance in recent decades as a result of their wider dissemination, the emergence of new etiologic agents, and changes in sexual behaviors. More recently, interest in these diseases has increased even further because of their possible role in the sexual transmission of the human immunodeficiency virus (HIV) and because their incidence may provide a useful means of monitoring trends in safe sex practices among at-risk groups.

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In Italy, gonorrhea and syphilis are among the 71 diseases for which reporting is legally mandated. Despite these legal requirements, however, considerable underreporting has been documented (*1*). The need for more reliable data on these "classic" venereal diseases as well as on such "second-generation" STDs as chlamydia, genital herpes, and venereal warts has led to the development of a formal sentinel surveillance system for STDs.

The Italian National STD Surveillance Network was established in 1990. The objectives of this system are threefold: a) to obtain a rapid and accurate picture of the occurrence and spread of STDs; b) to identify trends in disease occurrence; and c) to monitor changes over time by geographic area.

METHODS

No formal STD clinics exist in Italy. Instead, most patients are seen in dermatovenereology clinics, which are part of the governmental health-care network. At these centers, all care is provided free of charge. Alternatively, patients are seen in governmental gynecology or general medicine clinics or by private physicians.

In the surveillance system, efforts have been concentrated on a representative sample of clinics in the public sector. Based on a census conducted in 1989 of 85 clinics throughout the country that provide care for STD patients, 47 were selected for inclusion in the surveillance network. Criteria for inclusion included autonomy of the center, size of the catchment population, availability of laboratory services, and the center's geographic representativeness. Forty-four are dermatovenereology clinics; the remaining three are gynecology clinics.

The directors of the 47 selected centers were initially contacted by letter, informed of the surveillance project and its objectives, and invited to attend an organizational meeting. All agreed to participate.

A data collection form was prepared with information for each patient to be collected in a line listing. Data items collected for each patient included demographic, medical, and behavioral characteristics (sexual orientation, injecting drug use, number of sexual partners, contraceptive use, and previous STDs), diagnosis and method(s) used to confirm the diagnosis, and previous or current testing results for HIV. A protocol was designed that included case definitions for each disease, with the minimal clinical and laboratory criteria and instructions on how to complete and submit the data forms. Patients seen for the same STD in the same center within the previous 90 days were excluded to avoid duplicate reporting.

A meeting for the directors of the participating centers was organized before surveillance was initiated to discuss the protocol and the data collection form. At that time, a formal statement of participation was obtained from each center. Eighteen of the centers then participated in a pilot test of the system over a 4-month period in late 1990. On the basis of their recommendations, modifications were made in both the form and the protocol. A second meeting was then held to train representatives from all 47 centers in the methods of data collection.

Initially, all forms were filled out by hand; subsequently, personal computer-based software has been developed to allow direct data entry in those centers with access to a computer. Forms or diskettes are submitted monthly to the Istituto Superiore di Sanita', where data are entered if necessary, editing checks are performed, and the data are periodically analyzed. Routine feedback is given via a biannual report.

RESULTS

At the end of the first semester of activity (January-June 1991), 35 of the 47 centers had submitted data to the surveillance system (Figure 1). The number of centers reporting increased at first, after telephone and personal contacts were made with the directors of centers that had not reported (Figure 2). These contacts were generally successful in overcoming local obstacles to surveillance, which included lack of personnel, conflicts with local authorities, changes in surveillance sites, and changes in surveillance coordinators. Subsequently, however, the number of centers reporting has again begun to decrease.

A total of 5,049 patients were reported during the pilot study and the first 6 months of surveillance (Figure 3). The median age of the patients was 30 years, and two-thirds (66%) were males (Figure 4).

For men, the most frequently reported diseases were genital warts and nongonococcal urethritis (Figure 5). For women, the most frequent diagnoses were nonspecific vaginitis and genital warts.

HIV test results were available on 3,277 (65%) of the patients. Of these, 10% were HIV positive. The rate of seropositivity among heterosexuals who do not use drugs was 2.2% (Figure 6).

DISCUSSION

As with many other countries in Europe, Italy has no tradition of public STD clinics, and patients are seen by a variety of medical practitioners and outpatient services (*2*). The need for high-quality data on STDs has become even more acute with the epidemic of HIV infection, and many European countries are facing the challenge of collecting data in a way that best represents the situation in their countries.

FIGURE 1. Surveillance for sexually transmitted diseases — Italy, January–June 1991

FIGURE 2. Reporting centers participating in the National STD Surveillance Network, by month — Italy, September 1990–June 1991

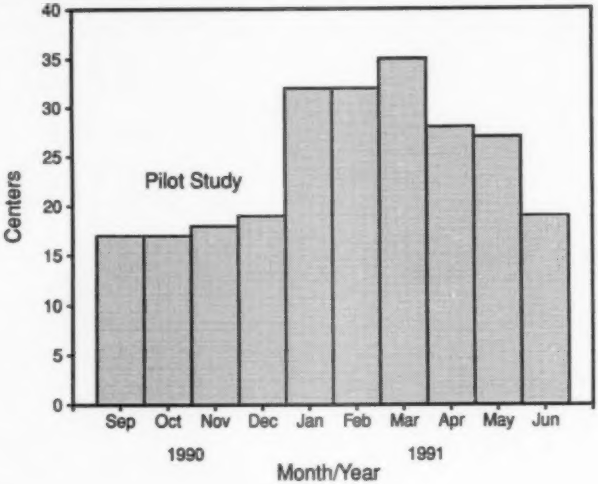


FIGURE 3. STD cases reported to the National STD Surveillance Network, by month — Italy, September 1990–June 1991

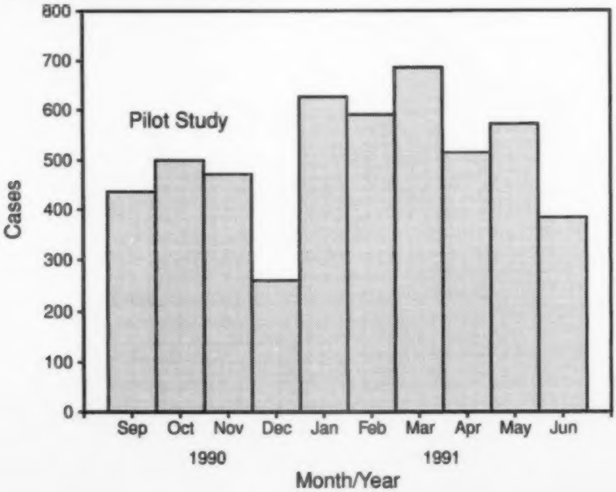


FIGURE 4. Number of cases identified by the National STD Surveillance Network, by age and gender — Italy, September 1990–June 1991

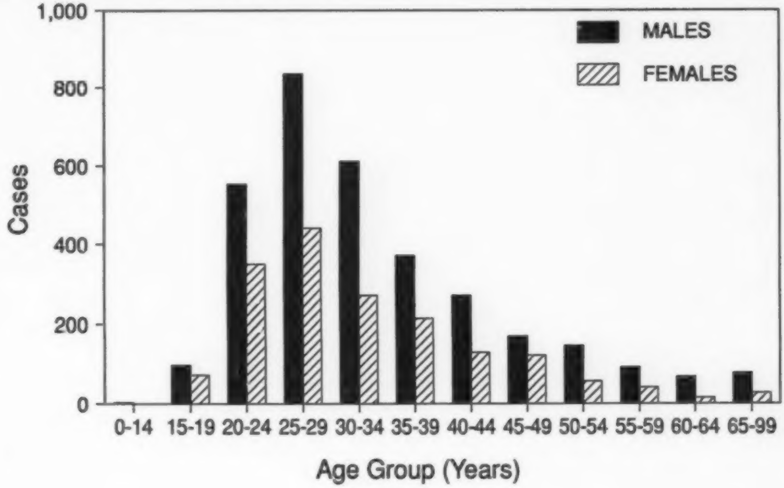


FIGURE 5. Number of cases of sexually transmitted diseases, by gender — Italy, September 1990–June 1991

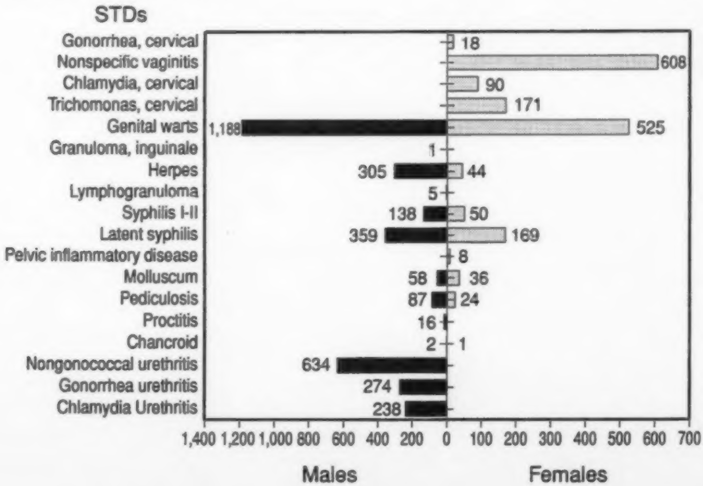
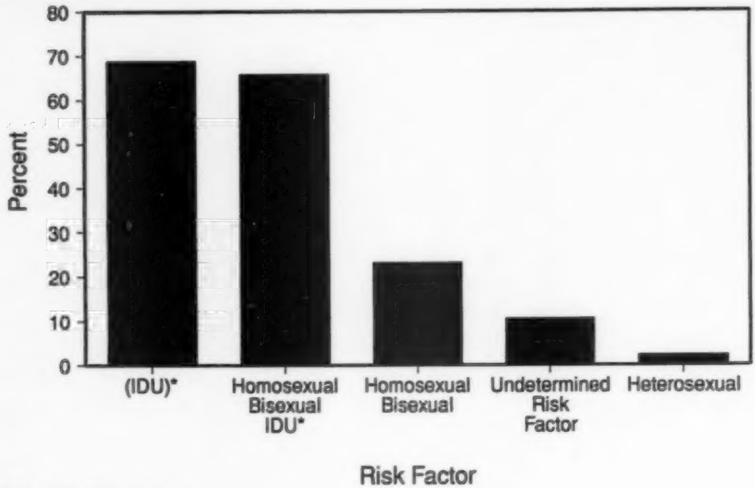


FIGURE 6. Proportion of cases of sexually transmitted diseases associated with positivity for human immunodeficiency virus, by risk factor — Italy, September 1990–June 1991



*Injecting drug user.

Numerous solutions are being attempted, including sentinel surveillance systems similar to the system reported in this document, practitioner-based reporting systems, and laboratory-based reporting (*3-6*).

High levels of collaboration were obtained from the vast majority of centers included in the Italian STD Sentinel Surveillance Network. Nonetheless, some problems emerged, especially with respect to timeliness and accuracy of the data obtained. A reporting delay was observed, with only half the centers submitting data within 30 days after the end of each month. Repeated telephone calls have been made to the centers that delay in reporting, with minimal effect. It is hoped that timeliness will improve as the number of centers performing direct computer data entry increases.

All data forms are checked before data are input into the computer, and editing checks are performed. Initially, many of the forms were incomplete or incorrectly filled out. Errors were corrected whenever possible by contacting the centers by telephone to request verification and correction. The number of mistakes has decreased over time, as physicians' experience with the data collection forms has increased.

Both the pilot surveillance system and the current surveillance data suggest that some decreases in reporting may occur. To keep interest in the system high, the centers receive feedback via biannual reports and periodic meetings with surveillance participants. Additionally, abstracts and papers being submitted to scientific meetings and journals acknowledge the contribution of the participants, and several have been asked to participate in surveillance-based research projects. However, visits by members of the coordinating center to selected STD clinics appear to represent the

most effective means of improving and enhancing collaboration. Such visits have led to higher quality reporting, more frequent requests for consultation and suggestions, and the development of studies focused on specific topics of interest to local authorities.

The preparation of the protocol for surveillance has underlined the need to establish diagnostic guidelines for STDs based on the available laboratory services and therapeutic guidelines based on relevant common experiences. These topics may be addressed subsequently through a consensus conference.

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